

### **Remarks**

Claims 1-7, and 11-18 were pending. Claims 11, 12, and 18 have been amended. New claims 19 and 20 have been added. Accordingly, upon entry of this amendment claims 1-7, and 11-20 will be pending. No new matter has been added.

Support for the amendments and new claims can be found throughout the specification including the claims, and more specifically in the following sections:

Support for the amendments to claims 11 and 12 can be found in Example 1 on page 5.

Support for new claim 19 can be found on page 2, second full paragraph.

Support for new claim 20 can be found on page 4, second full paragraph.

#### ***35 U.S.C. section 112, second paragraph***

The Office has rejected claims 11 and 12 as being indefinite. Applicants disagree and request reconsideration.

The Office has questioned the use of the language “wherein the caustic is 5% to 40% (15% to 30%) by weight.” To clarify, Applicants have amended the claims to refer to “by weight percent.” Additionally, to directly answer the Office’s question the language refers to the weight of the caustic itself in relation to the total weight of the mixture and an exemplary calculation is provided in Example 1 of the instant application.

#### ***35 U.S.C. section 103***

The Office has rejected claims 1-7 and 11-18 as being unpatentable over Hu *et al.* (Journal of Food Biochemistry 23:187-196, 1999) in view of Konda *et al.* (Biol. Pharm. Bull. 23:1458-1463, 2000). Applicants disagree and request reconsideration.

As noted by the Office, Hu *et al.* does not teach reaction times that are longer than one hour, pressures higher than 15 psig, or temperatures higher than 121°C. Moreover, Hu *et al.* also teaches that longer reaction times will produce shorter chitosan chains (*see*, second full paragraph on page 192). This is in contrast to Applicants’ findings as further described in the accompanying declaration from James Trinkle. Briefly, Applicants direct the Office to Tables 1 and 2 of the instant application providing data showing the average molecular weight of chitosan produced at pressures greater than

0 psig for 4 or more hours. These data show that the highest molecular weight chitosan molecules are not present from the beginning of the reaction (*e.g.*, 4 hours in Table 1 and 6 hours in Table 2) as would be predicted by Hu *et al.* This is due to the dynamics of the reaction which involve at least three different sub-reactions. These sub-reactions are the degradation of glucans which are bound to the chitin, the deacetylation of the chitosan, and the depolymerization of the chitosan. Applicants assert that given the teachings of Hu *et al.* one of ordinary skill in the art would not have known to increase the duration of the reaction to produce the higher average molecular weight chitosan molecules. Therefore, one desiring to produce higher molecular weight chitosan upon reading Hu *et al.* would NOT have been motivated to increase the reaction time to greater than one hour as provided in independent claims 1 and 17.

The Office additionally cites Butelman *et al.* (Applicants note that this reference was not cited in the opening paragraph of this section of the Office action, but Applicants interpret this 103 rejection as being directed to the combination of all three references) to make up for the deficiencies of the Hu *et al.* reference. The Butelman *et al.* reference discusses a method of extracting chitosan from arthropod waste (shellfish waste). It is well known in the art that shellfish waste does not contain glucans. Glucans are bound to fungal chitin and therefore, treatment of chitin from arthropods and treatment of chitin from fungi do not follow the same reaction dynamics (*see*, accompanying declaration from James Trinkle). Therefore, one of ordinary skill in the art would not be motivated to combine the teachings of these two references.

Finally, the Office uses the Konda *et al.* reference to support the assertion that quality chitosan is desirable and therefore, one of ordinary skill in the art would have been motivated to combine some of the reaction conditions from the Hu *et al.* reference with some of the reaction conditions of the Butelman *et al.* reference. As mentioned above, Hu *et al.* teaches using shorter reaction times and the Butelman *et al.* reference teaches conditions that may work for converting chitin that is not complexed with glucans. Therefore, contrary to the Office's assertions the Konda *et al.* reference does not provide motivation or teachings that would have lead one of ordinary skill in the art to combine the cited references. In light of the comments provided above and the accompanying declaration Applicants respectfully request that this rejection be withdrawn.

***New claims***

Applicants have added new claims 19 and 20. The Office has questioned what Applicants mean when referring to high quality chitosan and in some instances high quality chitosan is chitosan that has higher average molecular weight. New claim 19 is directed to such chitosan. Claim 19 is directed to a method of making chitosan that has an average molecular weight of greater than 80,000. New claim 19 is patentable over the cited references for the reasons provided above, and additionally because the references individually, or in combination, fail to describe a method of making chitosan having a molecular weight of greater than 80,000.

Similarly, new claim 20 is directed to methods of making chitosan from *Aspergillus* fungal biomass. New claim 20 is patentable over the cited references for the reasons provided above, and additionally because the references individually, or in combination, fail to describe a method of making chitosan from *Aspergillus* biomass.

Accordingly, Applicants respectfully request that claims 19 and 20 be allowed.

**Conclusion**

Based on the foregoing amendments and arguments, the claims are in condition for allowance and notification to this effect is requested. If for any reason the Examiner believes that a telephone conference would expedite allowance of the claims, please telephone the undersigned at (503) 595-5300.

Respectfully submitted,

KLARQUIST SPARKMAN, LLP

One World Trade Center, Suite 1600  
121 S.W. Salmon Street  
Portland, Oregon 97204  
Telephone: (503) 595-5300  
Facsimile: (503) 595-5301

By /Paula A. DeGrandis/  
Paula A. DeGrandis  
Registration No. 43,581